CULTURAMA
Cultural Interactive Panorama

Technical Field:
The CULTURAMA is an invention that is related to the field of interactive panoramic displaying systems using projectors.

Prior Arts:
Several panoramic displaying systems have been introduced before, including both research-level and commercial products. They provided the ability to display an image with 180 degrees and more, some were able to provide a hemi-spherical displaying as well.
While all of the previous systems succeed to deliver a real panoramic image displaying, none of them was built upon simple technologies, enabling this kind of displays to the widest range of designers and developers. For an instance, most of them depended on ultra expensive and complex edge-blending systems to create a seamless continues image; others depended on computer-driven motorized mirrors to animate certain elements across the panoramic display.
While most of these concepts delivered a very nice experience to the audience, they still have the following disadvantages:

- Hi-cost: most of the previous systems depended on complex edge-blending systems to create a seamless continues image, while this technology delivers very good results, it is still too expensive to be purchased by many developers.
- Complexity: most of the previous systems presented a major disadvantage which is the lack of usability, in other word; they were not easy-to-use systems. This includes both the ease of setting up the system and the ease of developing contents to be displayed using the system.
- Fixed systems: all of the previous systems were not optimized to be portable; this eliminates them from being exposed to different cultures in occasion's exhibitions and events.
- Incompatibility: because they use special hardware/software, many of the current systems do not permit the use of traditional software packages to develop visual contents.
- Closed technology: because they are based upon special technology, most of the current systems do not allow for easily upgrading or integrating the system. For an instance, you can not easily replace the projector or displaying screen.

CULTURAMA was built with all the previous disadvantages in mind.

Abstract:
The CULTURAMA is a projector-based panoramic displaying system.
It can display different visual materials including video, real-time graphics, virtual reality environments and similar types of contents.
It is composed of traditional hardware/software components and extremely easy to setup and use, making it available to a wide range of users/developers.
The shape of the display can be adjusted to take any form ranging from totally flat (wall display) to curved (panoramic display) and ending up with free form curvature (2 or 3 centers curve). The displayed area can also be adjusted to cover varies field of views ranging from 23 to 207 degrees in the horizontal direction and from 17 to 34 in the vertical direction. Depending on its configuration, the display can have different aspect ratios from normal 4:3 aspect ratio up to 13:1.

Detailed description:

CULTURAMA was built using regular and non-special hardware components. The currently used hardware is as follows:

- A PC with dual 3.02 GHz Xeon processors, 2GB RAM, 4PCI slots equipped with four dual outputs VGA cards 64MB.
- The projection set which is composed of nine ceiling mounted LCD projectors with luminance of 2200 ANSI.
- The receiving set which is composed of nine flat advertising stands 2.7mx2m to be used as projection screens.
- Wireless mouse and keyboard.
- Surround sound system 7.1

To achieve the panoramic display, the above mentioned components are installed together as follows:

First as for the receiving set (2 in figure 1) setup, the nine flat screens (3 in figure 1) are arranged to form the shape of the panoramic display (a linear, circular, semi-circular...). To achieve this, the angles between each two successive screens have to be equal. Depending on the area of the hall in which CULTURAMA will be set, this angle varies, for a linear shape display it will be 180° for a semi-circular shape it will be 158°. Thus, we can produce a curved screen for displaying the panoramic image using regular flat screens. To obtain seamless screens we used advertisement stands with projection material instead of ad banners.

The projectors of the projection set (1 in figure 1) are connected to the single computer as follows:

A. 4 PCI cards each can output to 2 projectors resulting in 8 projectors connected to the PC
B. 1 AGP card that can output to an extra projector, that makes them 9 projectors connected to the same computer. Using the extended desktop feature in the Windows operating system the computer can outputs its image through the 9 projectors as a single and seamless image.

The projection set is ceiling-mounted and arranged on an arc similar to the screen arc but with a smaller diameter. The diameter of the projection set depends on the projectors model and the screen width. Each projector (2 in figure 2) is adjusted to project its image on one of the screens of the receiving set, the facing one.

The basic concept of producing a seamless panoramic display in our system is the accurate alignment of the projectors; this is easily accomplished using our in-house made projector mounting kit. The projector mountings kit is a housing case that carries the projector and allow for accurate adjustments to its position and orientation in each direction separately. The mounting kit is used to hang the projector directly to the ceiling or to the hanging platform (figure 3) in case of the portable system.

As a result of using traditional and non-special equipments, the projection set and the receiving set can be easily and quickly customized to produce differently shaped panoramic displays (linear, circular, semi-circular or any other shape). This is done by adjusting the angle between each two successive screens in the receiving set to create the desired shape of the display and adjust the projection set accordingly to allow each of the projectors to project its image perpendicularly on the facing screen.

To make the system portable, we have developed a special hanging platform (figure 3) for the projection set, and popup screens for the receiving set. The hanging platform is composed of nine metal bars (1 in figure 3) those can freely slide in a perpendicular direction to their axis, each of the bars have a sliding ring (2 in figure 3) that can freely slides along the bar axis, this ring is used to hang the projector (3 in figure 3) to the platform. The platform is used to generate any shape for the projection set; this is done by sliding the bars and the rings to draw the required

shape. The hanging platform is designed to be easily assembled and disassembled. Because of being easy assemble, customize and disassemble, the hanging platform gives the system the advantage of being portable.

Software of CULTURAMA

As for the software development, the main idea is to develop a single multimedia interactive program with a screen size matches the total size of the nine screens together. This means a single program with the size of
7200x600 pixels. Few of the multimedia authoring tools can produce this output resolution so we are using Macromedia director to develop the software for CULTURAMA.
Although we are currently using CULTURAMA to deliver cultural information, the same system and methodology can be used to display a wide range of other information types.

Current programs displayed in CULTURAMA

One of the main advantages of CULTURAMA is to allow the display of specific contents those could not have been displayed before; the following is a presentation of the currently displayed contents on the CULTURAM:
CULTURAMA has three main sections, which represent three different periods of the Egyptian history. Those sections are Ancient Egyptian Period, Highlights of Coptic & Islamic Civilizations and Modern Egypt. In the first section, we introduce the Ancient Times by displaying the timeline of the Pharonic period starting from 3000 B.C. untill the start of the Gregorian calendar. All the well-known kings are presented by a photo in which they are placed in their correct chronological position. Pointing to any of those kings, basic information is displayed, which represents the first level of information. Without CULTURAMA screen, one could have never been able to display such a timeline on a single screen. Furthermore, if the user wants to know more stories about specific kings, he can just click on this particular king where the second level of information is displayed. For example, Thotmosis III who built an outstanding room in the Karnak Temple, called the botanical garden. On the walls of this room, he has documented the natural elements known in Egypt at his time. By clicking Thotmosis III, the walls of the botanical garden are displayed giving the audience the chance to see all the animals, birds, and plants inscribed on the walls. Moreover, selecting any of these elements will display more information about it in which a recent photo of the bird or the plant is displayed together with description that is considered the third level of information.
Another section that can be reached from the time line is the Rhind mathematical papyrus (RMP), which is considered one of the most famous mathematical papyri from the time of Pharaohs. The RMP is five meters long and contains 86 different mathematical problems and their solutions. Using CULTURAMA enabled us to display RMP and to magnify it 3 times on one screen. Furthermore, users can interact with the papyrus to zoom into any of the problems in order to see the English translation of the hieroglyphic text.
Another key feature of CULTURAMA is the ability to display on it panoramic scenes of some places or sites. This technology is specifically used in Coptic & Islamic Civilizations the modern Egypt sections. For example in modern Egypt section, we currently display a panoramic view of Cairo from the Nile and Alexandria from the sea. Users can interact with the panorama to navigate or select some of the components in the view in order to see more information about this component, which is considered the second level of information in this section. For instance, in Cairo panorama you can click on one of the old bridges on the Nile to see a movie clip of that bridge filmed by the brothers Lumiere in 1895.

Claims:

1. A system capable of displaying interactive computer programs on a large area using nine flat screens to build single seamless customizable panoramic screen, depends on traditional technology and have the following advantages:
   - Simple to operate and maintain
   - Simple to install
   - The shape and area of the display are easily customizable
   - Can run any kind of visual contents, both self-running and interactive
   - Can be used in various applications like educational, technical and cultural

   And is composed of:
   a. Multiple projectors (the projection set) those project the panoramic image on the receiving set
   b. Multiple screens (the receiving set) those are arranged seamlessly in front of the projection set
   c. Single PC that runs the computer programs and connects to the projection set through a number of VGA cards

2. The projection set (according to claim 1), is composed of nine fixed projectors, each one projects a portion of the computer program on the opposite screen of the receiving set, resulting in seamless panoramic image of the computer program on the receiving set
3. The receiving set (according to claim 1), can be easily customized to produce differently shaped panoramic displays (straight, circular, semi-circular or any other shape) by adjusting the angle between each two successive screens
4. The projection set (according to claim 1), can be adjusted to produce panoramic displays those cover different field of views in the horizontal and vertical direction.
5. The displaying system (according to claim 1), is composed of regular, available and easy-to-use technologies making it a low-cost panoramic displaying system
6. The displaying system (according to claim 1), can display stereoscopic contents
7. The PC (according to claim 1), is connected to the projection set through five VGA cards, each can output to two projectors, and can run programs contain different types of visual contents
8. The program (according to claim 7), can contain both self-running and interactive contents
9. The program (according to claim 7), have an extremely hi resolution (7200*600 or higher)
10. The displaying system (according to claim 1), can be used to display different types of contents like: information, 2d and 3d animations, video, panoramic images and real-time 3d graphics
11. The receiving set (according to claim 1), use flat screens to produce custom-shape panoramic display (linear, circular, semi-circular...)

12. A portable system capable of displaying interactive computer programs on a large area using nine flat screens to build single seamless customizable panoramic screen, depends on traditional technology and have the following advantages:
    - Simple to operate and maintain
    - Simple to install
    - The shape and area of the display are easily customizable
    - Can run any kind of visual contents, both self-running and interactive
    - Can be used in various applications like educational, technical, promotional and cultural

    And is composed of:
    a. Multiple projectors (the projection set) those project the panoramic image on the receiving set
    b. Multiple screens (the receiving set) those are arranged seamlessly in front of the projection set
    c. Single PC that runs the computer programs and connects to the projection set through a number of VGA cards
    d. A hanging platform for the projection set that can be easily installed
13. The projection set (according to claim 12), is composed of nine fixed projectors, each one projects a portion of the computer program on the opposite screen of the receiving set, resulting in seamless panoramic image of the computer program on the receiving set
14. The receiving set (according to claim 12), can be easily customized to produce differently shaped panoramic displays (straight, circular, semi-circular or any other shape) by adjusting the angle between each two successive screens
15. The projection set (according to claim 12), can be adjusted to produce panoramic displays those cover different field of views in the horizontal and vertical direction.
16. The displaying system (according to claim 12), is composed of regular, available and easy-to-use technologies making it a low-cost panoramic displaying system
17. The displaying system (according to claim 12), can display stereoscopic contents
18. The PC (according to claim 12), is connected to the projection set through five VGA cards, each can output to two projectors, and can run programs contain different types of visual contents
19. The program (according to claim 18), can contain both self-running and interactive contents
20. The program (according to claim 18), have an extremely hi resolution (7200*600 or higher)
21. The displaying system (according to claim 12), can be used to display different types of contents like: information, 2d and 3d animations, video, panoramic images and real-time 3d graphics
22. The receiving set (according to claim 12), use flat screens to produce custom-shape panoramic display (linear, circular, semi-circular...)
23. The receiving set (according to claim 12), composed of multiple pop up flat screens those can be easily folded and unfolded
24. The hanging platform (according to claim 12), can be easily adjusted to have different projection sets(straight, circular, semi-circular or any other shape)
25. The hanging platform (according to claim 12), can be easily assembled and disassembled

Figures description:

Figure (1): perspective view for the panoramic displaying system

1. The projection set
2. The receiving set
3. The projection screen
4. Audiences' seats

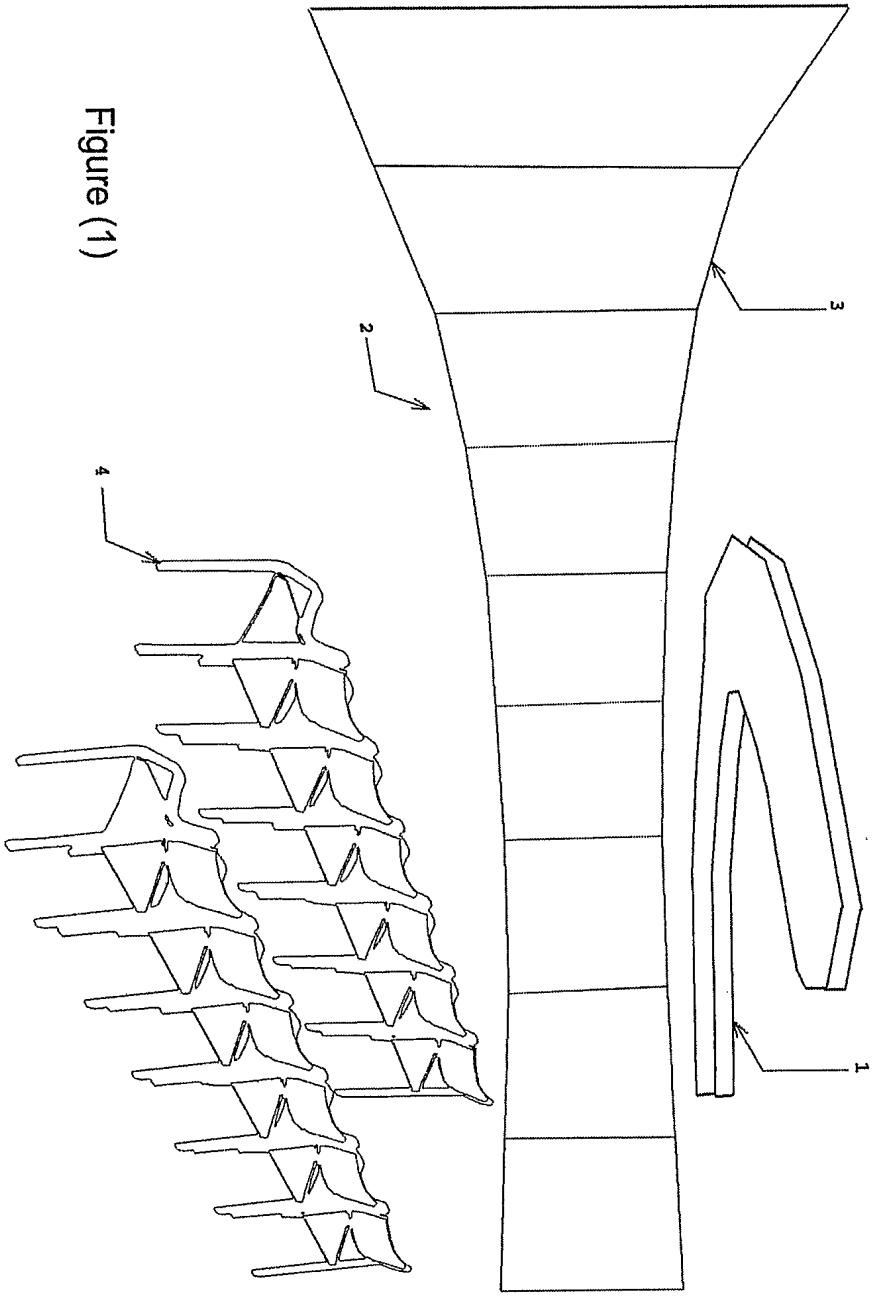
Figure (2): plan view for the panoramic displaying system

1. The projection set
2. Projector
3. The receiving set
4. The projection screen
5. Audiences' seats

Figure (3): plan view for the panoramic hanging platform

1. Metal bar
2. Sliding ring
3. Projector

Figure (1)



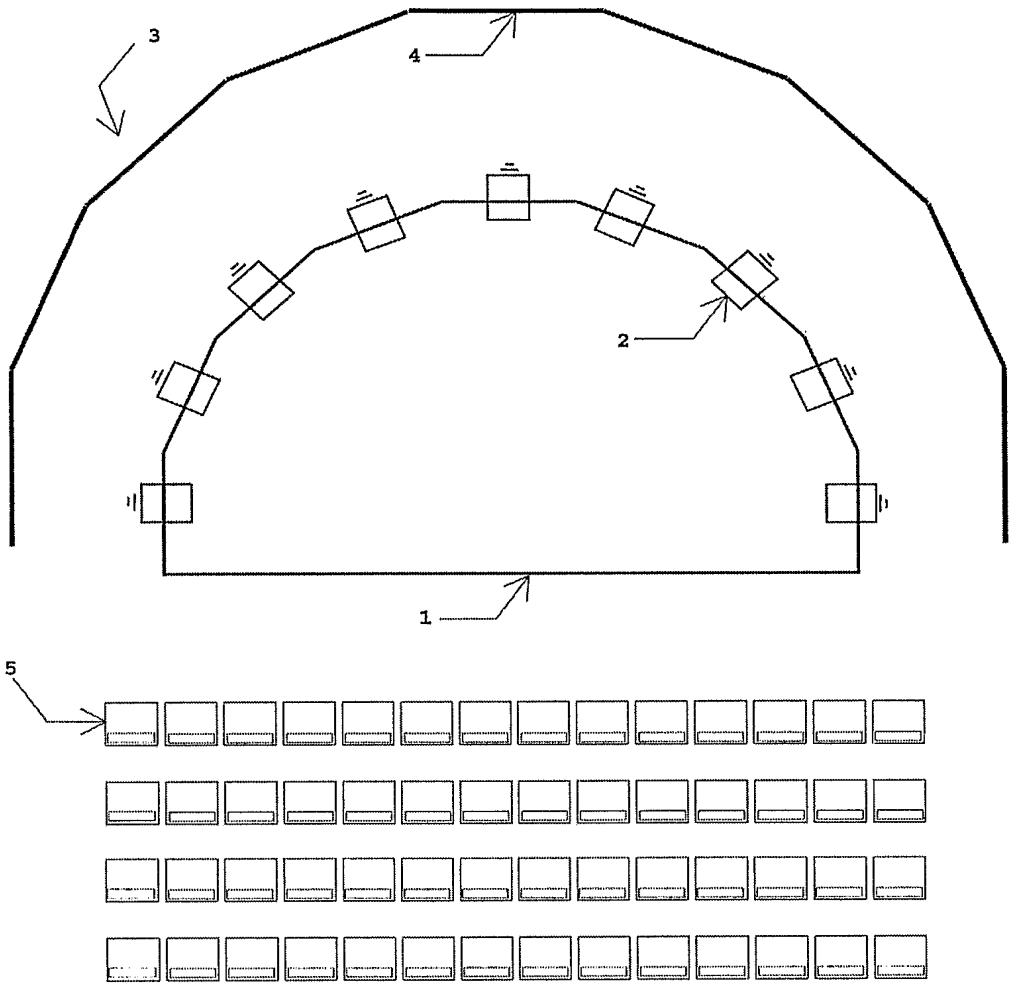


Figure (2)

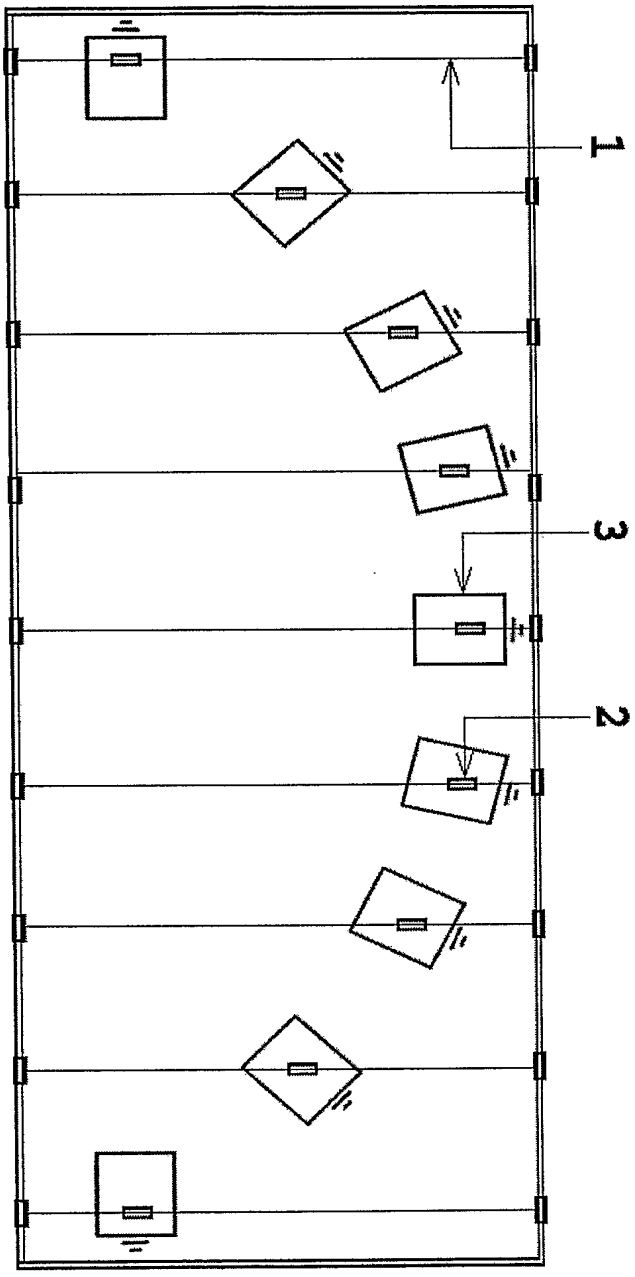


Figure (3)